

We claim:

1. An apparatus for correlating a spread-spectrum signal sample with a reference code, comprising:

a correlation lag at a prior sampling instance; and

5 storage means for storing the correlation lag;

wherein a correlation lag for the current sampling instance is generated based on the correlation lag for the last previous sampling instance.

10 2. The apparatus of claim 1, wherein the correlation lag is an even-correlation lag.

15 3. The apparatus of claim 1, wherein the correlation lag is odd-correlation lag.

4. The apparatus of claim 3, wherein a second correlation lag is generated, the second correlation lag being an even correlation lag.

20 5. An apparatus for correlating a spread-spectrum signal sample with a reference code, comprising:

spread spectrum signal storage means for storing the spread-spectrum signal sample at a present sampling instance and at a previous sampling instance;

subtraction means for calculating a difference between the present sampling instance and the previous sampling instance;

multiplication means for computing the multiplication result of the difference calculated by the subtraction means and an element of the reference code;

correlation lag storage means for storing a correlation lag obtained at the last previous 25 sampling instance; and

addition means, coupled to the outputs of the multiplication means and the correlation lag storage means;

wherein the addition means generates a correlation lag for the present instance based on the previous value of the correlation lag.

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6. The apparatus of claim 5, wherein at least one of the spread spectrum signal storage means and the correlation lag storage means include a surface-acoustic-wave (SAW) device.

7. The apparatus of claim 5, wherein at least one of the spread spectrum signal storage 10 means and the even-correlation-lag storage means include a charge-coupled device (CCD).

8. The apparatus of claim 5, further comprising a rotating-reference generator including a plurality of storage elements configured as end-around shift registers.

9. The apparatus of claim 8, wherein the stream of spread-spectrum signal samples is generated from a received BPSK signal composed by means of periodic repetition of a PN sequence.

10. The apparatus of claim 8, wherein the stream of spread-spectrum signal samples is 20 generated from a received CPSK signal composed by means of periodic repetition of a PN sequence.

11. The apparatus of claim 5, wherein the correlation lags are even-correlation lags.

25 12. The apparatus of claim 5, further including a negator configured to generate odd correlation lags.

13. An apparatus for correlating a plurality of streams of a spread-spectrum signal sample with a reference code, comprising:

spread spectrum signal storage means for storing the spread-spectrum signal sample at a present sampling instance and at a previous sampling instance for each stream;

subtraction means for calculating a difference between the present sampling instance and the previous sampling instance for each stream;

multiplication means computing the multiplication result of the difference calculated by the subtraction means and an element of the reference code for each stream, the element of the reference code for each stream being the same element;

correlation lag storage means for storing a correlation lag obtained at the last previous sampling instance for each stream; and

addition means, coupled to output of the multiplication means and the correlation lag storage means;

wherein the addition means generates a correlation lag for the present instance based on the previous value of the correlation lag.

14. An apparatus of claim 13, wherein the plurality of streams of spread-spectrum signal samples are generated from a BPSK signal composed by means of periodic repetition of a PN sequence.

15. An apparatus of claim 13, wherein the plurality of streams of spread-spectrum signal samples are generated from a CPSK signal composed by means of periodic repetition of a PN sequence.

16. An apparatus of claim 13, wherein the plurality of streams of spread-spectrum signal samples are generated from a QPSK signal composed by means of periodic repetition of a PN sequence.

5        17. An apparatus of claim 13, wherein the plurality of streams of spread-spectrum signal samples are generated from a multicarrier BPSK signal each of subcarrier signals being composed by means of periodic repetition of a PN sequence.

10      18. An apparatus of claim 13, wherein the plurality of streams of spread-spectrum signal samples are generated from a multicarrier QPSK signal each of subcarrier signals being composed by means of periodic repetition of a PN sequence.

15      19. A method of producing a correlation lag for a spread spectrum signal sample, comprising the steps of:

storing spread-spectrum signal samples obtained at the current sampling instance and at a plurality of previous sampling instances in a shift register; and

computing the correlation lag for the current sampling instance based on: (i) a correlation lag for a previous sampling instance; (ii) a reference code; (iii) the spread-spectrum signal sample at the current sampling instance; and (iv) the spread-spectrum signal sample at a previous sampling instance.